cancer shows the effectiveness and the absence of excess toxicity (above the level II) after the CRT with accelerated fractionation dose in CBT. It is assumed to analyze the dynamics of accumulation of cytogenetic markers in PBL and their deviation from the normal distribution in the course and after the CRT of cancer patients.

**PO-0755**

**Organ shape variations influencing PTV concepts for cervix cancer ART**

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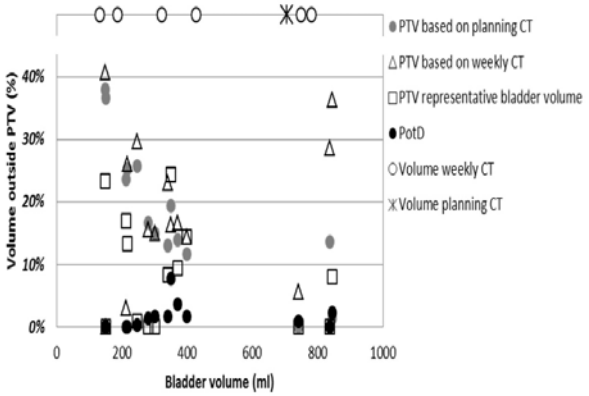
**Purpose/Objective:** Adaptive radiotherapy approaches for cervical cancer patients can have different levels of update frequency, varying between re-planning halfway along the treatment, weekly re-planning and plan of the day approaches. We investigated the variation in organ shape within a treatment week and the exemplarity of different adaptive strategies.

**Materials and Methods:** For 8 cervical cancer patients we obtained weekly CT scans and daily CBCT scans. The primary and nodal GTVs, bladder, rectum, sigmoid, bowelbag were delineated in all 215 scans by a radiation oncologist. Six patients were classified as mover (>2.5 cm top of uterus motion), two as non-mover. In order to assess the appropriateness of different adapted PTV concepts, the volume of the cervix-uterus CTV that exceed those PTVs was calculated for a static PTV based on planning scan, a weekly update of the PTV based on weekly CT scan, a PTV of the CT scan with a similar bladder filling status, and based on a plan of the day (PotD) approach that consists of an empty – half full PTV and a half full – full PTV.

**Results:** For the commonly used planning strategy that uses one planning CT scan with arbitrary bladder volume, up to 40% of the daily CTV can be outside the PTV during one or more fractions of the treatment; for movers with a large bladder filling variation, on average 20-25%. Adaptation of the PTV by re-planning on a weekly CT scan, or re-planning based on a CT scan with similar bladder volume, decreased the volume of the daily CTV outside the PTV somewhat (Figure). Besides bladder filling also the status of the rectum influenced the position. A PTV created with a PotD approach, resulted in acceptable small volumes outside the PTV (average 2%). For three mover patients the uterus flipped backwards for a few days during treatment and a non-mover changed into a mover for a few fractions.




**Conclusions:** We found that re-planning based on weekly imaging, although this gives a good idea about organ position variability and tumor shrinkage, is not sufficient to reflect the full extent of internal organ motion because the patient changes daily and often weekly scans are not made at the same time point (and organ configuration) as the treatment fraction itself. Furthermore, bladder volume-dependent cervix-uterus motion models that were prepared in the planning phase should be monitored carefully throughout the treatment because they can change.

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**Carbon-ion and photon radiation effects on HPVñpositive and negative cervical carcinoma cells**

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**Purpose/Objective:** To compare the effect of photon and carbon-ion radiation on four cell lines with different HPV-status regarding cell cycle regulation and HPV associated protein expression. Hypothesis is that carbon ion radiation might overcome radiation resistance of HPV-negative cells or cells with integrated HPV.

**Materials and Methods:** W12 cell line was derived from a low grade cervical lesion by Stanley MA et al. 1989, and is unique among HPV16-containing cell lines in carrying its HPV 16 genome as a multicopy episome. W12 cells contain episomal HPV 16 genomes, whereas S12 cells, which derived from the W12 line, contain HPV DNA as integrated copies. Caski cells have their origin in epidermoid cell cervical cancer and are reported to contain an HPV 16 genome as well as sequences related to HPV-18. C33A is a HPV-negative human cervical cancer derived cell line. Cell cycle analyses were performed using flow cytometry (PI staining) 24 h and 48 h after RT with 2 and 7 Gy using photon RT and 2 GyE and 7 GyE carbon ion RT(C12). Expression of pRb and p53 after irradiation with 2 and 7 Gy were analyzed by flow cytometry using intracellular staining comparing the mean fluorescence of 10000 gated cells.

**Results:** C33A cells (HPV-negative) showed a minimal enhanced expression of pRB after RT with photons or C12 (0 Gy=1.0, 2 Gy=1.09, 7 Gy=1. 4, 2 GyE= 1.3, 7 GyE=1.1). There was no effect of photon or C12 irradiation on p53 expression in C33A cells. Caski cells (HPV16/18 positive) showed increased expression of pRb after photon RT (2 Gy=1.3, 7